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Building & Highway Material Testing Laboratory

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T-2377

Job No.: CTCE/BBMP/BTR/W.No.13/CSR-08/407a/CEMENT/2017-18 Date: 07.08.2017

TEST REPORT ON CEMENT

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
*** Name of Work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
*** Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
*** Sample ID**	:	Cement – Sample 2
Sample Received on	:	05.08.2017
Period of Testing	:	05.08.2017 to 07.08.2017

The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988 (RA-2014)	27.00 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988 (RA-2014)	155 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988 (RA-2014)	470 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988 (RA-2014)	1 mm	Not more than 10mm

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Job No.: CTCE/BBMP/BTR/W.No.13/BC/Stability/2017-18 24.11.2017

TEST REPORT ON MARSHALL STABILITY OF MIX

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
***Name of the Work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
***Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
*** Source**	:	Hot mix Plant, Bangalore
*** Type of Mix**	:	Bituminous Concrete
Date of Testing	:	24.11.2017

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshall Stability, Kn	9.15	9.10	9 Kn (min)
2	Marshall flow, mm	2.30	3.35	2 – 4
3	Percent air voids in Mineral Aggregate	3.40	4.15	3 – 6
4	Voids in Compacted Mix	13.05	14.15	13 - 15
5	Percent Voids filled with Bitumen	67.25	68.60	65 - 75
6	Density, g/cc	2.26	2.27	--

*Information is furnished by the Customer/Representative.

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Job No.: CTCE/BBMP/BTR/W.No.13/BC/Agg/2017-18 24.11.2017

TEST REPORT ON GRADATION OF AGGREGATE

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of Work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
*Reference	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
* Sample ID	:	Bituminous Concrete
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Hot mix plant, Bangalore
Date of Testing	:	24.11.2017

Total Weight of Sample: **5200** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per `MORTH 500-18
13.2	780	15.00	15.00	85.00	79 - 100	
9.5	535	10.29	25.29	74.71	70 - 88	
4.75	655	12.60	37.88	62.12	53 - 71	
2.36	595	11.44	49.33	50.67	42 - 58	
1.18	530	10.19	59.52	40.48	34 - 48	
0.600	555	10.67	70.19	29.81	26 - 38	
0.300	425	8.17	78.37	21.63	18 - 28	
0.150	225	4.33	82.69	17.31	12 - 20	
0.075	425	8.17	90.87	9.13	4 - 10	

Total Weight of Sample: **5100** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH 500-18
13.2	650	12.75	12.75	87.25	79 - 100	
9.5	660	12.94	25.69	74.31	70 - 88	
4.75	680	13.33	39.02	60.98	53 - 71	
2.36	560	10.98	50.00	50.00	42 - 58	
1.18	690	13.53	63.53	36.47	34 - 48	
0.600	565	11.08	74.61	25.39	26 - 38	
0.300	385	7.55	82.16	17.84	18 - 28	
0.150	290	5.69	87.84	12.16	12 - 20	
0.075	325	6.37	94.22	5.78	4 - 10	

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Job No: CTCE/BBMP/BTR/W.No.13/BC/Bitumen/2017-18 24.11.2017

TEST REPORT ON BITUMEN CONTENT AFTER GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of Work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
*Reference		EE/DD/WO/127/2016-17 Dated: 21.02.2017
* Sample ID	:	Roads at Kalyanagar in Ward No. 13, BBMP, Bangalore
Technical Reference	:	IS 2386 and IRC:SP:11-1984
Date of Testing	:	24.11.2017

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	31.08	6.58	6.58	93.42	79-100
9.5	31.26	6.62	13.19	86.81	70-88
4.75	80.36	17.01	30.20	69.80	53-71
2.36	65.2	13.80	44.00	56.00	42-58
1.18	50.18	10.62	54.62	45.38	34-48
0.6	55.39	11.72	66.34	33.66	26-38
0.3	50.17	10.62	76.96	23.04	18-28
0.15	39.2	8.30	85.26	14.74	12-20
0.075	41.32	8.74	94.00	6.00	4-10

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	36.21	7.68	7.68	92.32	79-100
9.5	55.14	11.69	19.37	80.63	70-88
4.75	60.21	12.77	32.14	67.86	53-71
2.36	70.32	14.91	47.06	52.94	42-58
1.18	60.17	12.76	59.82	40.18	34-48
0.6	45.1	9.57	69.38	30.62	26-38
0.3	33.6	7.13	76.51	23.49	18-28
0.15	30.17	6.40	82.91	17.09	12-20
0.075	50.34	10.68	93.59	6.41	4-10

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Job No: CTCE/BBMP/BTR/W.No.13/BC/Bitumen/2017-18 24.11.2017

TEST REPORT ON BITUMEN CONTENT OF BITUMINOUS CONCRETE MIX

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	Mr. B T Ravikumar, #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
*** Name of Work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
***Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
*** Sample ID**	:	Roads at Kalyanagar in Ward No. 13, BBMP, Bangalore
Technical Reference	:	IRC:SP:11-1984
Date of Testing	:	24.11.2017

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.5	471.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	27.5	28.50
7. Bitumen content in %	5.50	5.70
8. Average	**5.60**	

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Job No.: CTCE/BBMP/BTR/W.No.13/BC/Sp_Wa/2017-18 24.11.2017

TEST REEPORT ON SPECIFIC GRAVITY AND WATER ABSORPTION

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
*** Name of Work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
***Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
*** Sample ID**	:	Hot mix plant, Bangalore
Technical Reference	:	IS : 2386(Part -3)-1963 (RA-2011)
*** Type of Mix**	:	Bituminous Concrete
Date of Testing	:	24.11.2017

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2009	2010	2012	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1239	1238	1257	
4	Weight of saturated surface dry aggregate in air	W_3 g	2005	2007	2009	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	766	769	752	
6	Weight of oven dried aggregate	W_4 g	1996	1998	2000	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.606	2.598	2.660	2.621
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.637	2.629	2.692	2.652
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.45%	0.45%	0.45%	0.45%

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/BTR/W.No.13/BC/Stripping/2017-18 24.11.2017

TEST REPORT ON STRIPPING VALUEOF ROAD AGGREGATES (STATIC IMMERSION TEST)

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
*** Name of Work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
***Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
Technical Reference	:	IS: 6241
*** Type of Mix**	:	Bituminous Concrete
Date of Testing	:	24.11.2017

Type of binder : 80/100
Percentage of binder used : 5.00% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.00 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.27	96.73
2	3.3		
3	3.4		

*Information is furnished by the Customer/Representative.

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/BTR/W.No.13/BC/Shape.T/2017-18 23.11.2017

TEST REPORT ON FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

* Customer	:	**Asst. Executive** Engineer, Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of Work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
*Reference	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
* Sample ID	:	Hot mix plant, Bangalore
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	23.11.2017

Sl.No.	Description	Result
1	Flakiness Index	12.05%
2	Elongation Index	13.48%
3	Combined Flakiness & Elongation Index	25.53%

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.:CTCE/BBMP/BTR/W.No.13/BC/AIV/2017-18 23.11.2017

TEST REPORT ON IMPACT VALUE OF AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of Work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
*Reference		EE/DD/WO/127/2016-17 Dated: 21.02.2017
* Sample ID	:	Hot mix plant, Bangalore.
* Type of Mix	:	Bituminous Concrete
Technical Reference	:	IS: 2386 (Part- 4)-1963 (RA-2011)
Date of Testing	:	23.11.2017

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	395	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	88	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	305	307	
4	Aggregate Impact value = percent fines 100* (W2/W1) percent	20.78	22.28	**21.53**

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CTCE/BBMP/BTR/W.No.13/CSR-08/407a/QB(BC)/2017-18 23.10.2017

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
*** Name of work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
***Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
*** Sample ID**	:	Bitumen
Source/ Location	:	Hot Mix Plant, Bangalore.
Sample Received on	:	22.11.2017
Period of Testing	:	22.11.2017 to 23.11.2017

The results of the tests conducted on the bitumen sample are as follows:

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2014)	87	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2014)	46	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2014)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2014)	310	Min. 220

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Job No.: CTCE/BBMP/BTR/W.No.13/WMM/Shape.T/2017-18 09.10.2017

TEST REPORT ON FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

*** Customer**	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
*** Name of Work**	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
*** Reference**	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
*** Sample ID**	:	Wet Mix Macadam
Technical Reference	:	IS 2386(Part 1) 1963 (RA 2011)
Date of Testing	:	09.10.2017

Sl.No.	Description	Result
1	Flakiness Index	11.38%
2	Elongation Index	13.08%
3	Combined Flakiness & Elongation Index	24.46%

*Information is furnished by the Customer/Representative.

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Comments:

→ Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Basaveshwaranagar, Bangalore-560 079.

CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/BTR/W.No.13/WMM/AIV/2017-18 09.10.2017

TEST REPORT ON IMPACT VALUE OF AGGREGATE

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of Work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
* Reference	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
* Sample ID	:	Wet Mix Macadam
Technical Reference	:	IS : 2386(Part -4)-1963 (RA-2011)
Date of Testing	:	09.10.2017

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	388	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	302	
4	Aggregate Impact value = percent fines 100* (W2/W1)%	21.11	22.16	21.64

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Aggregate Impact value for Wet Mix Macadam is 30%

Note:

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JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/BTR/W.No.13/WMM/Gradation/2017-18 09.10.2017

TEST REPORT ON GRADATION OF WET MIX MACADAM

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of Work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
* Reference	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
Sample ID	:	Wet Mix Macadam
Technical Reference	:	IS 2386 (part-1)1963 (RA-2011)
Date of Testing	:	09.10.2017

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits As per Morth Table 400-13
53	0	0	0	100	100
45	130	130	2.6	97.4	95-100
22.4	1520	1650	33.00	67.00	60-80
11.2	1020	2670	53.40	46.60	40-60
4.75	620	3290	65.80	34.20	25-40
2.36	515	3805	76.10	23.90	15-30
0.600	420	4225	84.50	15.50	8-22
0.075	515	4740	94.80	5.20	0-8

*Information is furnished by the Customer/Representative.

Civil-tech Consultants & Engineers Bangalore

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T-2377

Job No.: CTCE/BBMP/BTR/W.No.13/CSR-08/407a/Cube/2017-18 29.09.2017

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of the work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
* Reference	:	EE/DD/WO/127/2016-17 Dated: 21.02.2017
* Sample ID	:	Drain Covering Slab Concrete
Technical Reference	:	IS: 516-1959 (RA-2013)
Size of cubes	:	150mmx150mmx150mm
Cross Sectional Area	:	22500 mm^2
* Grade of Concrete	:	M_{20}
Compressive Strength as on	:	28^{th} day
Sample Received on	:	29.09.2017

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	01.09.2017	29.09.2017	8.097	498.3	22.15
2	01.09.2017	29.09.2017	8.257	516.2	22.94
3	01.09.2017	29.09.2017	8.364	530.0	23.56

*Information is furnished by the Customer/Representative.

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AE-13

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VIDYARANI P.K.
Technical Manager

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T-2377

Job No.: CTCE/BBMP/BTR/W.No.13/CSR-08/407a/Cube/2017-18

29.09.2017

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

* Customer	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
* Agency	:	**Mr. B T Ravikumar,** #129, 3rd Main Road, HVR layout, Magadi main road,Bangalore– 560 079.
* Name of the work	:	Improvements to main and cross roads at Kalyana Nagarain Ward No.13, in Shettyhalli Sub Division ,BBMP, Bangalore.
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Size of cubes	:	150mmx150mmx150mm
Cross Sectional Area	:	22500 mm^2
* Grade of Concrete	:	M_{20}
Compressive Strength as on	:	28^{th} day
Sample Received on	:	29.09.2017

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	01.09.2017	29.09.2017	8.162	493.2	21.92
2	01.09.2017	29.09.2017	8.476	509.3	22.64
3	01.09.2017	29.09.2017	8.304	523.7	23.28

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